



ICAO ENGINE nvPM EMISSIONS DATA SHEET

SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent 1000-H3 BYPASS RATIO (-): 9.3
 UNIQUE ID NUMBER: 01P19RR110 PRESSURE RATIO π_{co} (-): 40.3
 COMBUSTOR: Phase5 Tiled
 ENGINE TYPE: TF RATED OUTPUT F_{oo} (kN): 287.1

REGULATORY DATA

CHARACTERISTIC VALUES:	LTO_{mass}/F_{oo} (mg/kN)	LTO_{num}/F_{oo} (particles/kN)	NVPM MASS CONCENTRATION ($\mu\text{g}/\text{m}^3$)
LTO/ F_{oo} AND MAX nvPM _{mass}	233.6	1.88E+15	3410
AS % OF CAEP/10 LIMIT	-	-	82.7
AS % OF CAEP/11 LIMIT (InP)	67.2	45.2	
AS % OF CAEP/11 LIMIT (NT)	109.2	67.8	

MEASURED DATA

MODE	POWER SETTING (% F_{oo})	TIME minutes	FUEL FLOW kg/s	EMISSIONS INDICES*		NVPM MASS CONCENTRATION PEAK nvPM _{mass} ($\mu\text{g}/\text{m}^3$)
				EI _{mass} (mg/kg)	EI _{num} (particles/kg)	
TAKE-OFF	100	0.7	2.108	71.6	2.45E+14	
CLIMB OUT	85	2.2	1.732	114.0	4.09E+14	
APPROACH	30	4.0	0.598	64.2	8.10E+14	
IDLE	7	26.0	0.232	18.3	4.35E+14	
LTO TOTAL (kg, mg, number of particles)			823	48261	3.89E+17	-
NUMBER OF ENGINES				1	1	1
NUMBER OF TESTS				3	3	3
AVERAGE LTO/ F_{oo} VALUES (mg/kN, particles/kN)				168.1	1.36E+15	-
MAX EI VALUES (mg/kg, particles/kg) AND MAX MASS CONC. ($\mu\text{g}/\text{m}^3$)				150.4	9.58E+14	2649

* Emissions Indices are corrected for thermophoretic loss and fuel hydrogen content

DATA FOR EMISSIONS INVENTORIES (ESTIMATIONS FOR ENGINE EXIT PLANE VALUES)

MODE	POWER SETTING (% F_{oo})	CORRECTED EMISSIONS INDICES	
		EI _{mass_SL} (mg/kg)	EI _{num_SL} (particles/kg)
TAKE-OFF	100	77.2	3.47E+14
CLIMB OUT	85	124.0	6.45E+14
APPROACH	30	74.7	1.82E+15
IDLE	7	22.2	8.78E+14

AMBIENT CONDITIONS

	From	To	FUEL	
BAROMETER (kPa)	100.8	101.6	HEAT OF COMBUSTION (MJ/kg)	43.34
TEMPERATURE (K)	287.0	292.6	HYDROGEN CONTENT (%mass)	13.97
HUMIDITY (kg water/kg dry air)	0.0080	0.0090	AROMATICS CONTENT (%vol)	15.9
			NAPHTHALENE CONTENT (%vol)	0.11
			SULPHUR CONTENT (ppm by mass)	300

MANUFACTURER: Rolls-Royce plc
 TEST ORGANIZATION: Rolls-Royce plc
 TEST LOCATION: Derby
 TEST DATES: 04/10/2018

REMARKS

1. Certification Report EDNS01000740804

** DATA SUPERSEDED **

SEE FOLLOWING UID FOR REVISED DATA:

02P23RR130